WHAT IS CLAIMED IS:

1. A storage device comprising:

a field emitter;

a storage medium having a storage area being in one of at least three states to represent information stored at the storage area; and

a read circuit for sensing the state of the storage area and providing an output signal representative of the sensed state.

2. The storage device of claim 1, further comprising:

a controller that receives the read output signal and determines the state of the storage area.

3. The storage device of claim 2, wherein the controller controls the field emitter for reading the state of the storage area.

4. The storage device of claim 2, wherein the controller controls the field emitter for writing the state of the storage area.

5. The storage device of claim 1, wherein the states of the storage area comprise a crystalline state and an amorphous state.

6. The storage device of claim 5, wherein the states of the storage area comprise a partially amorphous state.

7. The storage device of claim 1, wherein the read circuit senses the magnitude of the effect generated when an electron beam current generated by the field emitter bombards the storage area.

8. The storage device of claim 1, wherein the read circuit senses the current generated through the storage area when an electron beam current generated by the field emitter bombards the storage area.

9. A storage device comprising:

a field emitter;

a storage medium having a storage area being in one of at least three states to represent information stored at the storage area;

a read circuit for sensing the state of the storage area and providing an output signal representative of the sensed state;

a controller that receives the output signal and determines the state of the storage area; and

a micromover for moving the field emitter relative to the storage medium.

10. The storage device of claim 9, wherein the controller comprises an encoder configured to encode information for storage in one of the at least three states in the storage area.

11. The storage device of claim 9, wherein the controller comprises a decoder configured to decode information stored in the storage area.

12. The storage device of claim 9, wherein the controller comprises at least a portion of the read circuit.

13. An atomic resolution storage device comprising:

a plurality of field emitters configured to generate electron beam currents;

a storage medium in close proximity to the field emitters, the storage medium comprising a plurality of storage areas being in one of at least three states at or between a crystalline state and an amorphous state to represent information stored in each storage area; and

a read circuit for sensing the state of each storage area and providing an output signal representative of the sensed state.

14. The storage device of claim 13, further comprising:

a controller that controls a power density of the electron beam currents to read and write information at each storage area and that receives the output signal and determines the state of each storage area.

15. The storage device of claim 13, wherein an effect is generated when the electron beam currents bombard the storage areas; the magnitude of the effect depends on the state of each storage area; and the read circuit reads the information stored in each storage area by sensing the magnitude of the effect.

16. The storage device of claim 15, wherein the effect is a current generated through the storage area.

17. The storage device of claim 15, wherein the effect is the emission of secondary electrons and backscattered electrons from the storage area.

18. The storage device of claim 13, further comprising:

an interface configured for moving data between the atomic resolution storage memory and an external device.

19. The storage device of claim 13, wherein the storage medium comprises at least one of selenium, tellurium, and indium.

20. An atomic resolution storage device comprising:

a field emitter configured to generate an electron beam current of varying power density;

a storage medium in close proximity to the field emitter, the storage medium having a storage area; and

a controller adapted to control the field emitter,

wherein the storage area is adapted to being set into any one of at least three states at or between crystalline and amorphous based upon the varying

power density of the electron beam current when the electron beam current bombards the storage area.

21. A method for changing the state of an atomic resolution storage memory location, the method comprising:

providing a field emitter;

providing a storage medium in close proximity to the field emitter, the storage medium having a storage area adapted to being in one of at least three states at or between crystalline and amorphous to represent information stored in the storage area;

providing a controller adapted to control the field emitter;

generating an electron beam current of varying power density from the field emitter;

bombarding the storage area with the electron beam; and

sensing the state of the storage area.

22. The method of claim 21, wherein the power density of the electron beam is increased to a set level and then slowly decreased to change the state of the storage area from an amorphous state to a crystalline state.

23. The method of claim 21, wherein the power density of the electron beam is increased to a set level and then rapidly decreased to change the state of the storage area from a crystalline state to one of an amorphous state and a partially amorphous state.